

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

ORDER 92-092

SITE CLEAN-UP REQUIREMENTS AND IMPLEMENTATION OF THE ABOVEGROUND  
PETROLEUM STORAGE TANK ACT FOR:

CHEVRON U.S.A., INC., RICHMOND REFINERY  
ALKANE SECTOR  
RICHMOND, CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Board, finds that:

Description of Discharger

1. Chevron U.S.A. - Richmond Refinery, a subsidiary of Chevron U.S.A. Inc., (hereinafter called the Discharger), owns and operates the Richmond Refinery. The refinery, built at the turn of the century, produces a broad range of petroleum products as well as petrochemical and inorganic chemicals. The 2,900 acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County. The City of Richmond lies to the south of the facility. To the east and within one mile from the facility is industrial, residential, commercial and agricultural land use.

Existing Orders

2. The Board, on November 15, 1989, issued Updated Waste Discharge Requirements Order No. 89-175. That Order addresses refinery-wide requirements including requirements for the waste management units of the Alkane Sector.
3. Other Orders issued for the Refinery are:  

Order No. 92-010,	Waste Discharge Requirements for Landfill 15;
Order No. 91-098,	Cease and Desist Order for Pollard Pond and the Hydropits;
Order No. 90-146,	Site Cleanup Requirements for Plant 1/Additives Plant; and
Order No. 87-073,	NPDES permit for the refinery's discharge of treated water.

Alkane Sector Description

4. The discharger has identified eight sectors within the refinery's perimeter. This Order addresses only the Alkane Sector which is bounded by: the shoreline from No. 13 Separator to the natural hill west of the Hydropits known as Skeet Hill; a line extending roughly perpendicular from the shoreline at Skeet Hill along the western boundary of the Alkane Tankfield to the top of San Pablo Ridge; a line following San Pablo Ridge southeasterly; and, a line roughly perpendicular to the shoreline extending to the crest of San Pablo Ridge along the western boundary of the Poleyard Tankfield.

Hydrogeology

5. The Alkane Sector is located east of the Potrero-San Pablo Ridge and west of the Hayward Fault. Cycles of sea level fluctuation in the Pleistocene epoch resulted in a complex depositional sequence of interfingering alluvial and estuarine sediments overlying bedrock. Bedrock consists of sandstones, siltstones and shales of the Franciscan Formation which outcrop at various locations and generally dip 40 ° to 70 ° towards the southwest. The sedimentary units, subsequent to the bedrock, consist of clays and sandy clays which onlap onto the bedrock and thicken bayward. Three sedimentary units within the first 150 feet are identified as the "A Zone", "C Zone" and the "B Zone", sequentially from the top down. The upper portion of the "A Zone" consists of

artificial fill placed into bay margin wetlands. The Alkane Sector is partially on this fill. Three other water bearing zones have been identified, at depth below the "B Zone", but because of their significant hydrogeologic separation from the surface and lack of contamination, they have not been critically evaluated.

- a. The "A Zone" consists of artificially placed fill and peaty bay mud. The first water encountered in this sector occurs at about 5 to 15 feet from the surface. The fill material is of highly variable composition and density and generally ranges from 2 to 18 feet in thickness. The underlying bay mud, which pinches out about midway onto the Alkane Sector, has a maximum thickness of about 70 feet bayward.
- b. The next hydrogeologic zone, the "C Zone", is an 80-90 foot thick zone of interfingering alluvial and estuarine sediments. The permeable units occur as channels and lenses and are discontinuous across the site but appear to be hydraulically interconnected. Within the Alkane Sector, this zone is a brackish confined aquifer separated from the "A Zone" by young bay mud.
- c. The third zone, the "B Zone", is a relatively permeable unit approximately 100 feet below the ground surface. It ranges in thickness from 5 to 15 feet and contains potable water, but of limited production capacity. This zone is a confined aquifer and with sufficient vertical gradient to exhibit artesian conditions. This zone appears to be hydraulically separate from the overlying zones.

#### Groundwater Contamination

6. Significant levels of benzene, fluoride and total petroleum hydrocarbon (TPH) may be found in the "A Zone" groundwater within the Alkane Sector. The highest concentration of benzene was measured at 870 mg/l in the third quarter of 1985 and fluoride was measured at 530 mg/l. Levels measured in this area during the 1991 monitoring period for benzene were as high as 300 mg/l, fluoride as high as 85 mg/l and TPH as high as 4,200 mg/l. Both the concentrations and the extent of contamination have been decreasing, possibly due to the dischargers ongoing groundwater extraction program.
7. The discharger has submitted a proposal pursuant to Order No. 89-175, Provision C.2.b, entitled "Alkane Sector GPS Master Plan for Amended Hydropits Closure and Remediation of other Alkane Sector WDO Sites" dated March 30, 1990 and amended March 4, 1991. The plan proposes to install a groundwater protection system (GPS), which is a combination of a groundwater extraction trench and a slurry wall to control and extract contaminated groundwater from the first 15 to 30 foot thickness of the "A Zone". The geometry of the Alkane Sector GPS is such that about one third of the bay frontage is protected by a slurry wall with extraction wells and the other two thirds will have an extraction trench only. The construction of the Alkane sector GPS will be completed by November 1992.

#### Potential Sources of Contamination

8. The Alkane Sector encompasses the following facilities which have the potential to, or may have already contaminated the groundwater in this sector:
  - a. Hydrolyzing Pits (Hydropits) The Hydropits were constructed in 1949 and were in use until 1986. The unlined pits consist of three small surface impoundments with overall dimensions of 200 ft. by 150 ft. and a depth of 6 feet. The unit is located adjacent to San Pablo Bay. Effluent streams from the Hydrofluoric Acid (HF) Alkane Plant were routed through pipelines to the pits, where caustic (Potassium Hydroxide and Sodium Hydroxide) from the HF Alkane Treater and the Sulfur Recovery Units were added as neutralizing agents. The Hydropits/Schaeffer Slough received wastewater from the facility's Alkane Plant at a rate of 150,000 gallons/day. The waste stream contained neutralized hydrofluoric acid,

fluoride salts, and small amounts of oil. Benzene was a known constituent of the waste. Precipitants were excavated on an annual basis and shipped to an off-site Class I disposal site. This unit no longer contains hazardous waste and as such, has met the cease discharge requirements of the Toxic Pits Cleanup Act. The hydropits are currently undergoing closure and are scheduled to receive certification of closure by November 1992.

- b. Former Schaeffer Slough Schaeffer Slough was a ditch which carried the effluent from the hydropits to the No. 13 oil/water separator for eventual discharge to the waste water treatment system. The slough was 350 ft. long, 5 feet wide and 4 feet deep. Contaminated soils from the slough were excavated and deposited into the hydropits mentioned above. The slough is presently the site of a groundwater extraction trench.
- c. No. 13 Separator and Mud Sump The No. 13 Separator is located near the northeastern corner of the Alkane Sector. It was constructed of concrete in 1944 and has a capacity of 960,000 gallons. Since it began operation, it has been treating a continuous flow of oily process water by skimming oil off the surface and returning it to oil recovery tanks, allowing solids to settle to the bottom. The effluent was then routed to the wastewater treatment system. The Mud Sump was a low, unlined depression in the ground adjacent to the No. 13 Separator which was used for storage of mud and solids that settled on the bottom of the separator. Sludges were removed from the Mud Sump and backfilled with soil in the early 70's. Provision 12 of Board Order 89-175 requires that the discharger submit a groundwater investigation plan by April, 1990 and an investigation report by April, 1991. Submittal of those reports have been deferred by letter May 21, 1990.
- d. No. 7 Sump The No. 7 Sump was an elongated, unlined drainage sump located in the northern corner of the sector, next to Skeet Hill. Soil sample results did not indicate the presence of significant contamination with the exception of high pH. The soils have been neutralized and the sump covered. Provision 11 of WDR Order 89-175 requires that the discharger submit a groundwater investigation plan by April, 1990 and an investigation report by April, 1991. Submittal of those reports have been deferred by letter May 21, 1990.
- e. Sulfur Recovery Unit (SRU) Settling Basin The SRU Settling Basin is located west of the SRU No.1. The basin is concrete lined and constructed in 1973-1974. It is approximately 10 ft. by 6 ft. and 8 ft. deep and has a capacity of 3590 gallons of liquid. The basin receives sulfurous and sulfate solutions from the sulfur recovery unit and has pH values typically ranging from 5 to 6. The effluent from the basin is routed to the waste water treatment system. There are no known contaminant releases from this unit.
- f. Alkane Plant The Alkane Plant covers approximately 6.3 acres and is currently inactive. The primary products of this plant were aviation gasoline and alkyl benzene ("alkane") for detergent manufacture. Since early in 1990, the discharger has been extracting and treating contaminated water from two wells which are situated 170' apart. Soil and groundwater contamination at this location include phase separated hydrocarbons and soluble organics.
- g. Alkane Tankfield The Alkane Tankfield is a 21 acre facility consisting of approximately the northwestern half of the Alkane Sector. The majority of the site's forty tanks were constructed in the mid-1940's, with the rest built in the late 1950's. Ten of these tanks remain in service. The Alkane tanks have contained light to heavy gasoline, naphtha, oils, solvents, and alkanes. Pursuant to Provision C.13.b of Board Order 89-175, the discharger has submitted the report "Hydrogeologic Investigation, Alkane, Office Hill, S.P. Hill, and Quarry Tankfields" dated September 30, 1991, which concludes that hydrocarbon releases may have occurred from some of the tanks in the Alkane Tankfield. The investigation finds that shallow soils of the site show evidence of significant hydrocarbon contamination but that the groundwater does not appear to be impacted. Pursuant to Provision C.13.c of WDR

Order 89-175, the Executive Officer hereby determines that the aboveground petroleum storage tanks of the Alkane Tankfield have released or are releasing contaminants into the vadose zone and subsequently or eventually, into the groundwater under this tankfield. Consequently, the discharger is required to submit to this Board a Corrective Action Plan for the Alkane Tankfield.

Basin Plan

9. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 11, 1991. The Basin Plan contains water quality objectives and this Order implements the water quality objectives stated in the Basin Plan.

10. The beneficial uses of San Pablo Bay in the vicinity of the site are:

- a. Industrial service supply;
- b. Navigation;
- c. Contact and non-contact water recreation;
- d. Commercial and sport fishing;
- e. Wildlife and estuarine habitat;
- f. Preservation of rare and endangered species;
- g. Fish migration and spawning;
- h. Shellfish harvesting; and,
- i. Estuarine habitat.

11. The potential beneficial uses of groundwater underlying the site which is deeper than 100 feet are:

- a. Industrial process water and service supply;
- b. Agricultural supply; and,
- c. Municipal and Domestic Supply.

The shallow aquifers beneath the site have varying water qualities. The specific beneficial uses and appropriate cleanup standards for these shallow aquifers will be determined for each aquifer based on technical information to be developed during the investigative and remedial action plan approval process.

12. State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California" On October 28, 1968, the State Water Resources Control Board adopted a resolution which calls for maintaining the existing high quality of State waters unless it is demonstrated that any change would be consistent with the maximum public benefit and not unreasonably affect beneficial uses.

13. Regional Board Resolution No. 88-160, "Regional Board Position on the Disposal of Extracted Groundwater From Groundwater Clean-up Projects" On October 19, 1988, the San Francisco Bay Regional Water Quality Control Board adopted a resolution to encourage dischargers to recycle, in some beneficial manner, any groundwater that has been extracted and remedied of contaminants. In addition, the resolution encourages minimization of the discharge of treated water to local receiving waters under a site's NPDES permit whenever possible.

14. Unless otherwise noted, any references to Sections and Articles refer to Chapter 15, Division 3, Title 23 CCR.

California Environmental Quality Act

15. This action is an Order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the CEQA pursuant to §15321, Title 14, CCR.

Notification of Public Meeting

16. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code §13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
17. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that pursuant to authority in Section 13304 of the California Water Code, the discharger, its agents, successors and assigns that currently or in the future own this land or operate this facility, shall clean up and abate the effects described in the findings above as follows:

A. Prohibitions

1. The discharge, storage, or treatment of waste, or materials which may impact the beneficial uses of the ground and surface water, shall not be allowed to create a condition of pollution or nuisance as defined in Sections 13050 (l) and (m), of the California Water Code.
2. Migration of pollutants through subsurface transport to waters of the State beyond the GPS is prohibited.
3. The discharger shall not dilute the groundwater subject to remediation. Any extraction system being operated at this facility shall not extract water from the bay or from any other water body adjacent to the GPS unless approved by the Executive Officer.
4. The discharge of pollutants onto land, into the groundwater or into surface waters, except as permitted under the National Pollutant Discharge Elimination System, is prohibited.

B. Specifications

1. The discharger shall extract water from the GPS trench to a practicable level and acceptable to the Executive Officer. The net effect shall be to cause a groundwater gradient into the extraction GPS system, such that the bayward migration of contaminants is eliminated or reversed. The volume of water extracted at steady-state conditions shall be reported on a gallons-per-day basis. The discharger shall install a physical barrier downgradient of any extraction well(s) or extraction trench that is producing bay water in volumes which are not acceptable to the Executive Officer.
2. The discharger shall monitor the "A Zone" for contaminants and groundwater levels on both sides of the GPS trench/barrier for the primary purpose of evaluating the effectiveness of the GPS.
3. Pursuant to §13304 of the Water Code, the discharger is hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. The discharger shall reimburse the Board upon receipt of a billing statement for those costs.
4. The discharger shall perform free phase liquid petroleum hydrocarbon recovery activities, as needed, to remove the free phase petroleum hydrocarbons from beneath the facility. The discharger shall propose the methods to achieve this specification and the degree of cleanup but the proposal must be acceptable to the Executive Officer.


5. Any plan for remediation of the groundwater or soil shall call for extracting contaminants from a central area of any plume such that the contaminant does not migrate further from the source. The contaminant extraction shall be performed until cleanup levels are achieved. Cleanup levels and extraction rates will be proposed by the discharger but must be acceptable to the Executive Officer.
6. The Alkane Sector tankfields shall be monitored for releases to the soil and the groundwater pursuant to the Aboveground Petroleum Storage Act (SB1050), §25270.7. The current monitoring configuration, as previously approved by the Executive Officer, is not sufficient and must be upgraded to include structurally down dip monitoring wells and piezometers.
7. If the groundwater outside of the refinery's perimeter has been impacted by the facility, the discharger shall remediate that groundwater to levels acceptable to the Executive Officer and protective of the waters of the State.
8. During the clean-up period, no wastes shall be placed in a position where they can be carried from the unit into waters of the State.
9. Any plan for remediation of the groundwater or soil shall be designed to prevent migration of wastes to adjacent geologic materials, groundwater, or surface water, throughout the operation, closure, and post-closure periods of the site.
10. The containment structures shall be designed by, and constructed directly under the supervision of and certified by, a registered civil engineer or a certified engineering geologist.
11. Pursuant to §2541 of Chapter 15, the materials used for containment structures shall have appropriate chemical and physical properties to ensure containment of the contaminants. The permeability of the containment shall be determined as a function of its transmissivity potential of the contaminants found in this sector and in accordance with accepted civil engineering practice.
12. The integrity of containment structures shall be maintained at all times. The discharger shall maintain the structural integrity and effectiveness of all containment structures as necessary to correct the effects of settlement or other adverse factors. The discharger shall continue to operate the contaminant extraction system as long as it takes to achieve compliance with this Order.
13. All soil and groundwater samples shall be analyzed by State certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analyses to be performed. All laboratories shall maintain quality assurance/quality control records for the Board Staff review.
14. The discharger shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.
15. Groundwater Conservation The discharger shall consider the feasibility of reusing of extracted groundwater from the Alkane Sector, as specified in Board Resolution No. 88-160. The extracted groundwater includes water from any onsite or offsite groundwater extraction and remediation performed.

### C. Provisions

1. The discharger shall comply with the Prohibitions and Specifications noted above, immediately upon adoption of this Order and according to the time schedule herein.
2. The discharger shall submit a proposal acceptable to the Executive Officer, for monitoring the "A Zone" pursuant to Specification B.2 above. The report shall include locations of additional piezometers and water sampling wells to monitor the "A Zone" water levels and water quality on both sides of the GPS.  
REPORT DUE: October 15, 1992
3. The discharger shall submit a proposal acceptable to the Executive Officer, for monitoring the Alkane Tankfield pursuant to the Aboveground Petroleum Storage Act and Specification B.6 above. The report shall include additional monitoring wells for monitoring the first groundwater encountered and for monitoring the vadose zone if feasible. The discharger shall take into account the complexity of the hydrogeologic characteristics of both the bay fill areas and the bedrock.  
REPORT DUE: November 15, 1992
4. The discharger shall submit an amendment to the "Groundwater Protection System, Engineering Report" dated December 20, 1991, acceptable to the Executive Officer, which will provide for design considerations specified in B.1 of this Order. The report should establish the water levels to be maintained in the trench, propose a procedure to be used to determine when bay water is being produced and establish a contingency plan to install additional physical barriers, such as a slurry wall when the determination is made that excess amounts of bay water is being produced.  
REPORT DUE: December 15, 1992
5. The discharger shall submit a proposal acceptable to the Executive Officer, for remediation of the soil and groundwater for the benzene, hydrocarbons, and fluoride plume(s) of the Alkane Sector. Pursuant to Specifications B.4 and B.5, the discharger shall propose cleanup goals for the recovery of free phase hydrocarbons and the elimination of the sources of groundwater contamination.  
REPORT DUE: December 15, 1992
6. The discharger shall submit a report, acceptable to the Executive Officer, certifying completion of the installation of additional monitoring facilities pursuant to the AGT Act.  
REPORT DUE: February 1, 1993
7. As a consequence of Finding No. 8(g) of this Order and in compliance with Provision C.13(c) of Board Order No. 89-175, the discharger shall submit a Corrective Action Plan for the Alkane Tankfield area, acceptable to the Executive Officer. The plan shall incorporate any new information gathered pursuant to Provision C.3 above.  
REPORT DUE: June 1, 1993
8. The discharger shall submit a report acceptable to the Executive Officer certifying that the GPS for the Alkane Sector has been completed and is operating in compliance with Specification B.1 of this Order.  
REPORT DUE: December 1, 1992
9. The discharger shall submit a report detailing the feasibility of the reuse of extracted and remedied groundwater pursuant to Resolution 88-160 (Finding No.13 and Specification B.15).  
REPORT DUE: March 1, 1993

10. The discharger shall permit the Board, or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
  - a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which may be relevant to the Order.
  - b. Access to copy any records required to be kept under the terms and conditions of this Order.
  - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
  - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.
11. The discharger shall maintain a copy of this Order at this site so as to be available at all times to site operating personnel.
12. These requirements do not authorize the commission of any act causing injury to the property of another or of the public, do not convey any property rights, do not remove liability under federal, State or local laws, and do not authorize the discharge of waste without the appropriate Federal, State, or local permits, authorizations, or determinations.
13. If the discharger is delayed, interrupted or prevented from meeting one or more of the time schedules in this Order due to circumstances beyond their reasonable control, the discharger shall promptly notify the Executive Officer. In the event of such delays, the Board will consider modification of the time schedules established in this Order.

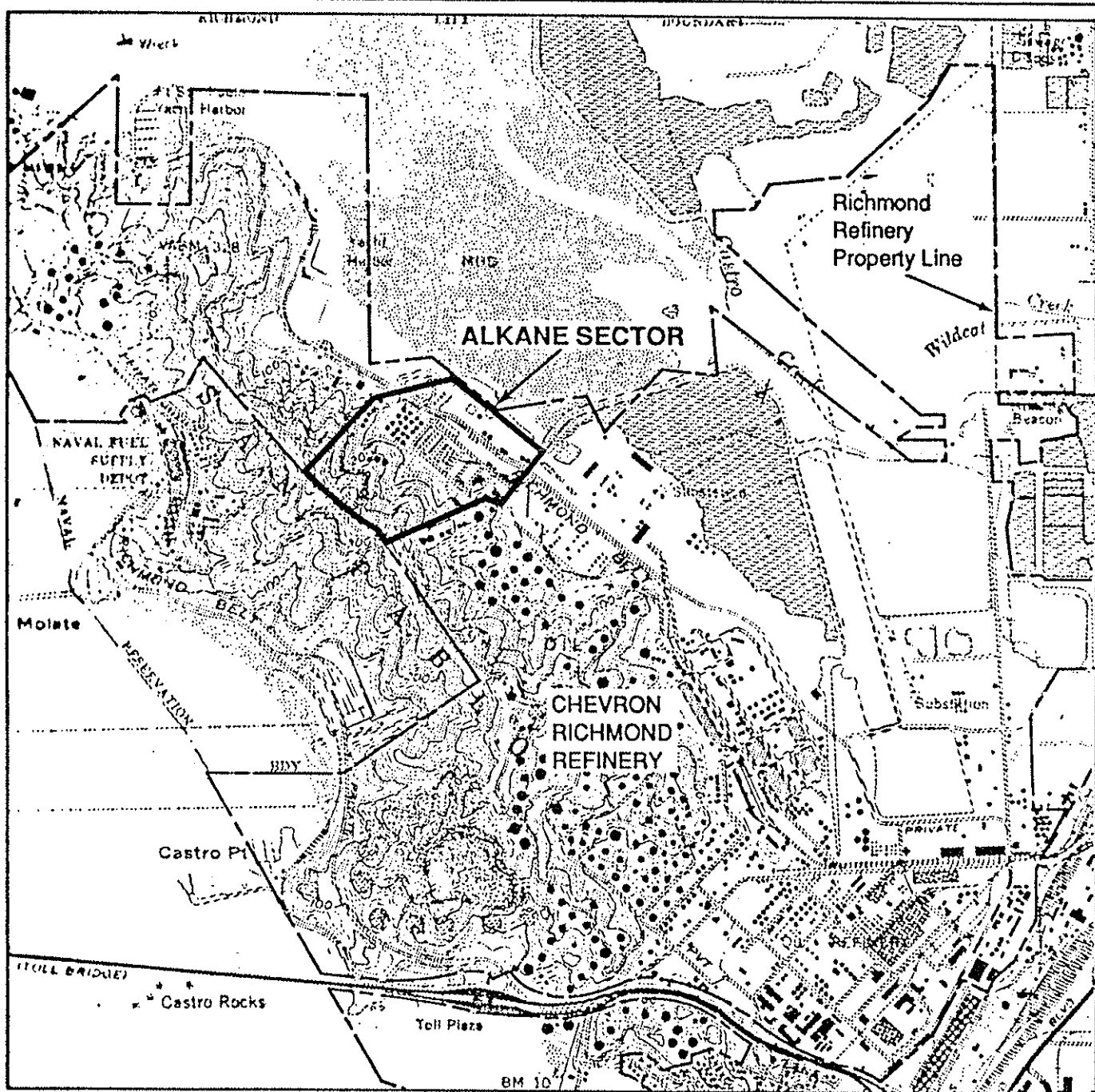
I, Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order of the California Regional Water Quality Control Board, San Francisco Bay Region, on August 19, 1992.



STEVEN R. RITCHIE  
Executive Officer

Attachments:  
Figure 1- Site Map  
Figure 2- Sector Map





Source: Modified from USGS San Quentin 7.5 Minute Quadrangle, 1959.  
Photo Revised, 1980.



QUADRANGLE LOCATION



STATE OF CALIFORNIA  
REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

CHEVRON U.S.A. RICHMOND REFINERY  
SITE MAP  
RICHMOND, CALIFORNIA

GEOLOGIST: GVL | DATE: 7/15/92 | FIG. 1

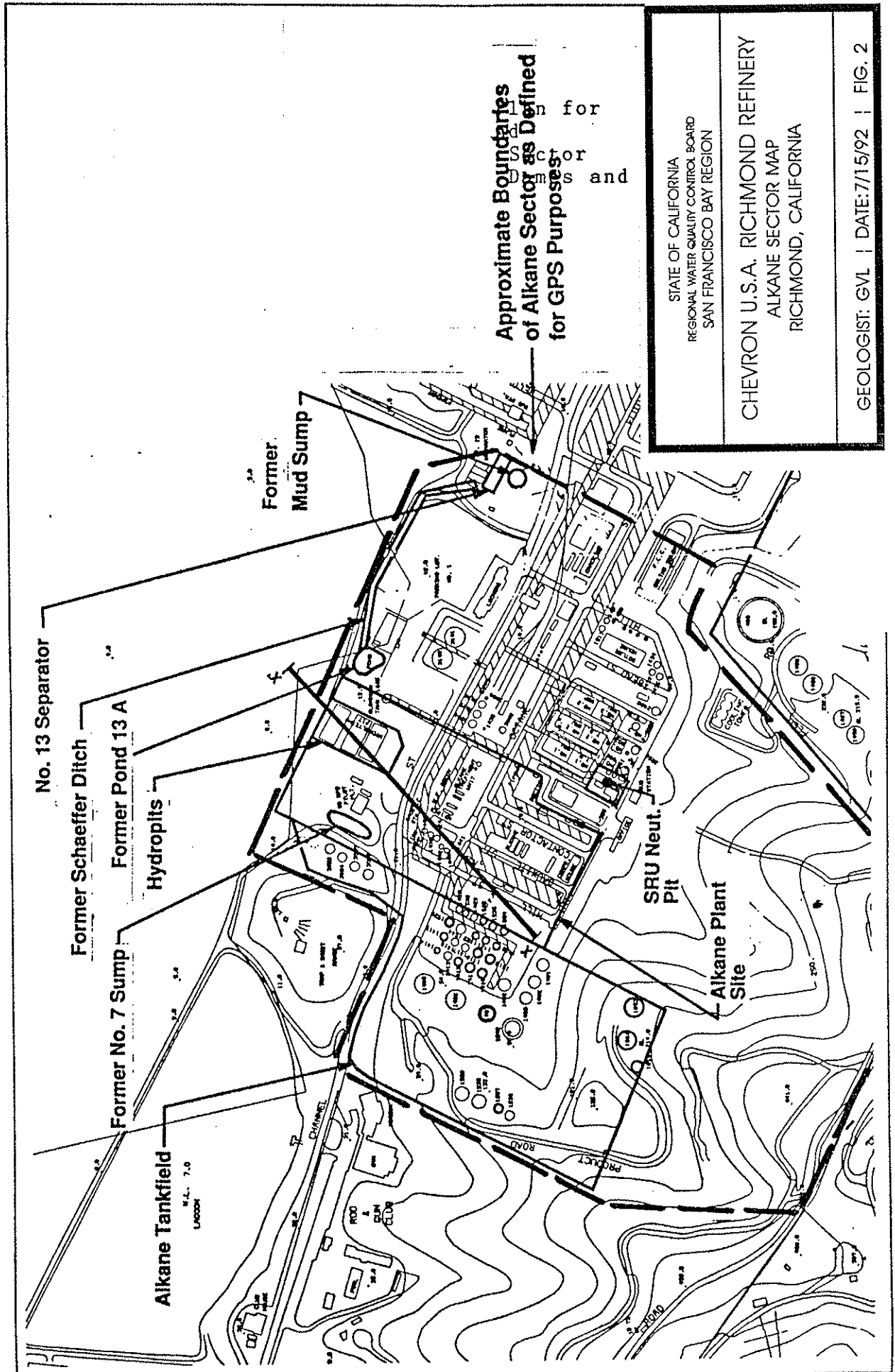


FIGURE 2